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# **Can a crowd sourcing app, for those with chronic conditions, lead to innovation design solutions?**

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## **Abstract**

### **Introduction:**

Given the rise of long term conditions [6], and focus on living independently in the community, we launched a crowd sourcing community app called 'ifOnly' to encourage people with disabilities to share the problems they encounter in everyday life. People record, upload and share videos and audios that demonstrate everyday problems they face at home.

The videos have been shared with designers who are asked to come up with innovative design solutions via a competition hosted by the University of Bath. The designs were considered by a panel of stakeholders; including representatives from the NHS, social care, creative industry and the third sector and members of the public. The goal is to bring together emerging designers and users to make things better.

### **Methods:**

After consultation with users, version 1 of 'ifOnly' was produced and tested by a patient panel consisting of carers of those with dementia; all new to smart phone technology. The consensus was that the video function was easy to use but the upload time was unsatisfactory and connectivity problematic, when relying on 3G rather than Wi-Fi. The high costs of iPhones were also highlighted by the panel.

Accordingly version 2 was developed, overcoming the technical and usability problems and released in apple and android stores. In response to feedback that smart phones were not accessible to all, a Research Assistant co-ordinated events to meet local people and patient groups, and conducted home visits with University smart phones, to make filming open to all. In total, over 100 films were uploaded.

A community of interest was developed with designers via the ifonly webpage, <http://www.ifonlyitworked.com/>, which displays the films and also via social media; Facebook and twitter accounts to connect with new and emerging innovators and designers with an interest in inclusive design. To enter the competition we encouraged design students to draw upon creative talent and utilise novel ideas, materials and techniques to design a product that would be suitable to be sold to members of the public. The challenges presented on our You Tube channel should help inspire innovative design solutions.

This competition focuses on the challenges faced by older and disabled people and we encouraged the widest possible range of ability (universal design) when creating solutions.

We will present the award for the winning entry at an inclusive design (called UX matters) event held on the 10<sup>th</sup> May 2013, in Bath.

## Discussion:

Given the engagement with the competition by designers, the quality and relevance of the entries, the number of films made and viewing statistics, the ifOnly app appears to be a promising tool to provide the infrastructure for crowd-sourced collaborations. The concept of ifOnly could be part of a toolkit which would help foster innovation and connection between designers and those with chronic conditions, and facilitate participatory design.

Methodologically, this approach is linked to the open innovation business model, where companies outsource the collation of ideas [12]. This is normally in a commercial context and continues on to co-development of products [13]. IfOnly has the potential to be expanded into co-design and co-creation with users and offers scope to mine this user driven intelligence.

## Conclusion

This project has shown that an app can be used to engage with people in order to gain insight into the problems and difficulties they face each day and inspire product designers to provide innovative solutions. In particular, ifOnly demonstrates the potential fruitful connection between user centred design and open access movements [2], through its use of YouTube.

With the ifOnly crowd sourcing technique, we gain an insight into users, into their needs and therefore gain a broader understanding with how products relate to users, potentially, in a globalised setting to which the app can easily be applied. This technique also generates critical information for industry who risks losing the customers, if they don't keep closely engaged. It also helps focus the energy and talents of their designers and innovators and gives users a real voice.

## Introduction:

Given the rise of long term conditions [6] and focus on living independently in the community, we launched a crowd sourcing community app called 'ifOnly' to encourage people with disabilities to share the problems they encounter in everyday life. People record, upload, and share videos that demonstrate everyday problems they face at home through the free downloadable app which are then posted on the 'ifonly' website - [www.ifonlyitworked.com](http://www.ifonlyitworked.com).

The videos were shared with designers who were asked to invent innovative design solutions via a competition hosted by the University of Bath and supported by the local UK National Health Service Research Office. The designs were considered by a panel of expert stakeholders, including representatives from business, advocacy, the design industry, health and academia, and the third (voluntary) sector. The goal was to bring together emerging designers and users to foster innovation.

In this paper we describe our ifOnly case study in the light of opportunities provided by social technologies to enhance design for those most affected by neglected or poor design. We harnessed the benefits provided to engage two communities, designers and those with chronic conditions, which would not traditionally connect on a large scale.

Designers were encouraged to view the ifOnly videos, and then to develop an original product that could solve any of the issues demonstrated or related problems. We encouraged designers to draw upon their creative talents using novel ideas, materials and techniques to design remarkable products. Designers were asked to send their blueprints, plans and descriptions via the ifOnly website.

The most innovative product designed, as decided by the judges, will be awarded a £5,000 prize and the achievements of the four other finalists will also be recognised at an ifOnly award and User Experience event. This competition provided student designers an opportunity to test their design thinking and make a difference to real life problems.

## Population

Recent statistics indicate that the population of elderly people in our society is rapidly increasing. The largest category of increase is the “oldest old” which includes people who are aged 85 and over [25]. Further statistics, released by AgeUK estimate that by the year 2025 there will be over 6 million elderly people in the UK suffering from some form of chronic illness or Long Term Health condition [26].

Christensen et al [7] show that the rise of long term conditions related to the ageing population is not only the situation in England or the UK. If trends continue, then most babies born since 2000 in France, Germany, Italy, USA, Canada, Japan, and other countries, will celebrate their 100th birthdays.

Researchers are currently exploring ways to facilitate the self-management of healthcare and to encourage independent living in older populations and those with chronic conditions; to facilitate independence [22]. In order to facilitate self-management, researchers have looked to new ideas and approaches such as the utilisation of mobile and social technology for innovative solutions.

## Social technologies

Social technologies have gathered enormous pace over the last 10 years, in particular smart phones, which have been adopted at a rate faster than any other technology in history [12]. Companies such as Nokia, Google, Microsoft, and Apple have all introduced smartphone operating systems (Symbian, Android, Windows Mobile, iPhone OS) and enabled open application development on smartphones, which all allow users to generate and access multimedia content [9].

According to Massimi and Baecker [20], 60% of men and women in the UK, aged between 60 and 64, own a mobile phone. This drops to approximately 30% for men and women who are over 80 years of age [14]. We anticipate that the future generations of older adults will be habituated mobile phone users who are comfortable and familiar with smartphone devices such as iPhones and BlackBerrys.

Smartphones offer a variety of functions, including the capability to connect to the internet virtually anywhere with a wireless internet and 3G. In addition to this, smartphones often include features such as cameras, video cameras, voice recorders, and GPS hardware. It is said, ‘a smartphone provides an essential any time, any place portal into the entire world wide web of knowledge’ [1].

DiSalvo et al [10] points to the possibilities offered to community groups for ‘mutual, fruitful connections’ and participatory design from free and open source software (FOSS). We wanted to explore whether smart phone apps with video capability and access to open

source platforms such as YouTube can provide a suitable infrastructure for crowd-sourced collaborations.

Crowd sourcing refers to emerging forms of social participation which are supported by social technologies [18]. Hagen et al [17] highlight social media as a new arena for participation and dissolving boundaries. These technologies are a valuable tool for designers as they allow for user input and feedback to be scaled up to ambitious levels and allow access to communities with long term conditions, which might be marginalised due to lack of mobility, co-morbidities or geography.

## **Methods:**

### **App development:**

The IfOnly App has been developed on two platforms both in native code. The first was developed for Apple's iOS, using Xcode (Xcode is the complete toolset for building Mac OS X and iOS applications) and the second - for Android, Android applications are written in the Java programming language. The Android SDK tools compile the code—along with any data and resource files—into an Android package.

The IfOnly application accesses the internal camera functionality to enable users to make a short 60 second time limited video clip. The video clip can then be uploaded to a private area on the ifOnly YouTube account where it will be previewed and released for public viewing. All public set video content is then accessible through the IfOnly Application; videos are categorised into: Household, Garden Products, Electrical Goods, Tools/Machinery, Personal Products and Miscellaneous. Videos are searchable or can be viewed in the order of the most popular or the latest uploads. Both Applications are available through the relevant app stores for download.

The interface has been developed for future scalability with the possibility to add new/more categories and expand the sharing options, bringing together both product designer and those faced with chronic conditions through a very simple to use interface. The application is consistent on both platforms and reaches the widest possible audience with iOS and Android, leading the way in app downloads and hardware capabilities.

The usability of the applications ensures the user has quick access to recording and uploading content, taking into consideration the vast differences in the user's technical skills both with mobile technology, but also creating and uploading video content, as this may be a first for some users. Clear buttons with few screens and fast navigation make the app easy to get in and out of - a key to making sure the app is used and comes with minimal barriers for the user.

### **Public and patient involvement:**

Version 1 of 'ifOnly' was produced and tested by a patient panel consisting of carers of those with dementia; all new to smart phone technology. The consensus was that the video function was easy to use, but the upload time was unsatisfactory and connectivity problematic, when relying on 3G rather than Wi-Fi. The high costs of iPhones were also highlighted by the panel.

Accordingly, version 2 was developed, overcoming the technical and usability problems, and released in apple and android stores. In response to feedback that smart phones were not accessible to all, a Research Assistant co-ordinated events to meet local people and patient groups, and conducted home visits with University smart phones to make filming open to all.

Local advertising was also placed in the media, and the app was part of a public demonstration of research in the University, called 'Images of Research'.

## User participation:

In total, over 100 films from the public were uploaded. Their content is wide ranging, from people diagnosed with/experiencing arthritis and find it painful to pour a heavy kettles, to those who cannot push operate a vacuum cleaner due to back pain. Members of the public either submit their recording themselves, using the instructions in our demonstration video <http://www.youtube.com/watch?v=8vOyqZg7Hlo&feature=youtu.be> and on the app, or via organised events, which we co-ordinated. In some instances, members of the public had a carer who spoke on their behalf. Our established relationship with the Carer's Network in Bath and our own Bath R&D public and patient carers research panel, were valuable in reaching the target population. We also established relations with other carers groups, such as the Care Forum in Bristol and promoted the app at the local Age UK and local Pain and other patient group meetings.

## Social media:

A community of interest, to promote the competition and app, was developed with designers via the ifOnly webpage, <http://www.ifonlyitworked.com/>, which displays the films, and also via social media, using Facebook and twitter accounts (Ifonlyitworked) to connect with new and emerging innovators and designers with an interest in inclusive design.

## Competition:

To enter the competition we encouraged design students to draw upon creative talent and utilise novel ideas, materials and techniques to design a product that would be suitable to be sold to members of the public. We suggested they study the challenges presented on our YouTube channel to help to inspire innovative design solutions. In addition, our Research Assistant visited Universities offering relevant product design courses to promote the competition, and provided a simulation exercise for students to illustrate how the design process affects the needs of different stakeholders.

We stipulated that entries must include visual representation. This could be hand-drawn or the designer could use computer software and submit the design electronically as a PDF. We also required written documentation, which discussed how the unique design features of your product might assist and improve users' day to day life. Lastly, we asked for a consideration of what kind of people might use this product, what materials might it be made from and what the designer had done to make the product aesthetically appealing and user-friendly.

The judging criteria considered the following aspects: universal design– we welcomed products which can be used by people with a wide range of functional and cognitive abilities. Cost – we asked students to design their product so that it can be produced and purchased affordably.

Aesthetics – we stressed: whilst your product should clearly be functional, aesthetics are also important. Usability – we asked that the product should be effective, simple and easy to use. Lastly, we highlighted innovation – we requested that the design should be unique and imaginative.

The competition was open to all UK residents over 18 years of age who were in higher education. Multiple entries were allowed. The University of Bath granted ownership of any intellectual property rights in submitted design to the originator.

Over 70 applications were received and the five strongest entries, as decided by the author with advice from a business expert, were selected for ultimate consideration by our judging panel. We will present the award for the winning entry at an inclusive design (called UX matters) event held in Bath, UK, on the 10<sup>th</sup> May 2013. Also, trophies will be given to all finalists. The day will feature relevant talks from researchers who have practised user centred design, a commercialisation expert and an author in product design plus stands from the Design Council, research groups, and industry representatives. The day will end with an opportunity to network over lunch.

### **ifOnly event:**

All finalists were invited to a film making session on the 13<sup>th</sup> April in Bath, where we discussed what led them to their ideas, the challenges they faced while developing their design and their experience of the competition generally. We also asked about their course, their place of stay and hopes for the future. The film will be screened at the ifOnly event of the 10<sup>th</sup> May and will also feature on our website.

In addition, we have invited all finalists to an ifOnly pre dinner, where they can meet with the judges and competition organisers in an informal and more relaxed setting and take advice on the best way to promote their design concept, protect the intellectual property and commercialise their product.

## **Results**

Although The University of Bath agreed to keep all entries confidential for the purposes of protecting intellectual property, the 5 finalists have provided vignettes which give a flavour of their concept without revealing technical details. The competition was won by Simon Lyons, who conceptualised a simple yet elegant cutting device for people with arthritis and other grip problems. Simon is a 4<sup>th</sup> year student at the Loughborough University studying Product Design Mechanical Engineering.

Other finalists included Leanne George, who is in her first year of a BSc in Product Design in Nottingham Trent University. She invented the key hole catcher which provides a simple but highly useful solution for those struggling to unlock their door with a key, due to hand tremors.

Samuel Clarke, a first year student in Product Design from Brunel University developed the 'Steady Write'. With the proposed design, Samuel suggested an ergonomic design which helped those with poor grip and thus difficulties with writing.

Martynas Gailiusas is in his second year, again in Product Design, at University of Bradford and designed 'Easy Boil'. He was inspired by one of the videos in the app and responded to the difficulties encountered by people who have problems using a traditional kettle due to its heavy weight.

Lastly, James Bristow, studying in his second year of 3D Design at Falmouth College, came up with his Counterweight Cutlery design. James entered the competition with a thoroughly tested and highly aesthetically pleasing cutlery concept which was designed to minimise hand tremors and allow for independent feeding.

In terms of access, we have had over 50 downloads of the app and 19, 976 hits on YouTube, so the material and resources were utilised. Our Twitter channel was also popular, with re-tweets to significant design groups with high membership.

All judges agreed the level of entry was high, and the 5 finalists all demonstrated novel and feasible ideas, which all addressed self-management and independent living in the community. At the filming event, all finalists agreed that the competition experience had been a positive and valuable one.

## **Discussion:**

Given the engagement with the competition by designers, the quality and relevance of the entries, the number of films made and viewing statistics, the ifOnly app appears to be a promising tool to provide the infrastructure for crowd-sourced collaborations. The concept of ifOnly could be part of a toolkit which would help foster innovation and connection between designers and those with chronic conditions, and facilitate participatory design.

Methodologically, this approach is linked to the open innovation business model, where companies outsource the collation of ideas [5]. This is normally in a commercial context and continues on to co-development of products [23]. IfOnly has the potential to be expanded into co-design and co-creation with users and offers scope to mine this user driven intelligence.

In traditional participatory design, practitioners and researchers are encountering limitations with user focused methods [16], so success stories from consumer businesses who have created virtual innovation groups are of interest [13]. For example, businesses such as Nike have developed open source forums on the web, where new basketball shoes are debated and developed by users - <http://niketalk.com/f/>

The advantage of ifOnly is that it allows virtual participation from a wide range of users, though active engagement with community groups. This should avoid perceived needs to be dominated by a few strong voices, or a one dimensional concern, such as utility. Although there was no deep quality control of the submitted films, only the most relevant films need be studied by designers. In the same way, open innovation company, Apache server software, only incorporate the best suggestions from consumers into its revised IT products, which are then distributed [21].

IfOnly also offers an ethical solution. When a community is faced with a problem, it needs a method to communicate these shared concerns and interests. Community activity groups have successfully used the web to engage with multiple users for town planning consultations [3]. Other self organised groups, such as radio amateurs' hobbyist have also found ways to make innovations available to others, through their broadcasts [2]. IfOnly provides a communication route for those with chronic conditions. These activities are in the spirit of advancing interests of those marginalised or resource poor, and also have the potential to enrich the scope and depth of participatory design [11].

Manufacturers are also beginning to see the commercial advantage of designing for those with disabilities and chronic conditions. As many older adults in the West have average disposal incomes, this is an important consumer target [19]. In addition, many adults are looking at older age as a time for fulfill personal ambitions [8], so products which make the management of older age, and finding ways to remain independent, become increasingly important consumer needs [15]. Carroll et al [4] confirms that the chances of successful design is much higher if consumer input is directly included.

Some limitations of ifOnly are noted. The author was contacted by several designers who wanted to meet with members of the public who had posted films. However due to their



vulnerable condition and other sensitivities, this was not possible. Instead advice was provided by a local Occupational Health Therapist with awareness of user involvement and participatory design, who worked for a local medical engineering charity.

It is acknowledged that an evaluation of the merits of the design was managed through the judging process, including a consideration of fit for purpose, for the users. Indeed one of the users was from a disability advocacy group. However, the extent to which ideas were triggered by the films of other experiences from the designers was not known. But since the spirit of ifOnly was to increase awareness of user issues and difficulties faced, this was not felt to be a significant issue.

It is also noted that this project is not resource free as it required a champion to promote the competition in Universities, to manage the competition and interact with community groups. We were fortunate to have funding support from KT-EQUAL ([www.kt-equal.org.uk](http://www.kt-equal.org.uk)) and Health Innovation Technology project, both Engineering and Physical Sciences Research Council research projects led by Professor Eccleston. However once established, given that platforms such as YouTube is open source and the app is freely downloadable, the ifOnly project could continue under its own steam.

## Conclusion

This project has shown that an app with video capability and access to open source platforms such as YouTube can be used to engage with people in order to gain insight into the problems and difficulties they face each day and inspire product designers to provide innovative solutions. In particular, ifOnly demonstrates the potential valuable connection between users and designers via social technology.

With the ifOnly crowd sourcing technique, we gain an insight into users, into their needs and, therefore, gain a broader understanding with how products relate to users, potentially in a globalised setting to which the app can easily be applied. This technique also generates critical information for industry which risks losing the customers if they don't keep closely engaged. It also helps to focus the energy and talents of their designers and innovators.

The last words to Bruce Mau [24] – '**Collaborate.** The space between people working together is filled with conflict, friction, strife, exhilaration, delight, and vast creative potential'.

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